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INTERACTIVE DISPLAY DEVICE

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INTERACTIVE DISPLAY DEVICE

FIELD OF THE INVENTION

This invention relates generally to a display device and, more particularly, to interactive display devices having pre-defined content.

BACKGROUND OF THE INVENTION

Fantasy role-playing games are popular group activities. For example, board games have been used for many years to entertain players. Fantasy games using exchangeable cards have become popular in recent years. In these games, players typically collect a variety of cards depicting fantasy characters. The cards are carried by players and, when players meet, the cards are traded, exchanged, or acquired. Exchanges can occur by mutual consent or through the application of game rules governing allowed interactions between the characters. These cards are typically printed with pictures of characters and rules. Hence, their visual entertainment value is limited.

More complex interactive playing systems are known. For example, U.S. 6,634,949 B1 entitled "Multi-Media Interactive Play System" issued on October 21, 2003 describes a multi-media interactive play system having a number of play elements situated in a variety of play environments or play media. The play elements are linked to a common record of participant performance, progress, character attributes, etc. The participant's performance in the play elements determines the play elements to which the participant may proceed as well as the play parameters of the play element in which the participant is currently involved. The play elements are thus interlinked to define a sequence or path network along which the participant advances. By advancing through the play elements the participant carries out a plot, story, theme, etc. that attaches a significance to the successful completion of a given play element or elements. Also disclosed is a variety of play elements suitable for use in the system, an example of a plot or theme that may be carried out by the system, and a send/receive radio frequency network that may be used to track play participants in a play center. However, such a system is extremely complex to implement, is

expensive, and does not conform to rules for more common card-based games currently popular with children and young adults. Importantly, such a system typically does not support the collection aspects of currently popular games.

A single element entertainment device commonly known as the Tamagotchi was introduced in Japan by the Bandia Corporation in 1997. The Tamagotchi device is a key-chain computer game. In an initial iteration of this device, the game starts when a virtual egg on a display screen hatches and a virtual chicken is born. The owner then uses a user interface to effectively raise the chicken by performing activities such as feeding, cleaning up after it, and playing with it. Like a real pet, constant daily interaction is necessary to ensure proper growth and development. A failure to provide such interaction has consequences including, in extreme cases, the virtual death of the virtual chicken. While popular in its genre, such Tamagotchi games lack the competitive interaction that is popular in the card based games and further the form factor and the constant interaction required by such devices typically prevents users from maintaining large collections of such devices.

A large variety of other more conventional programmable video game devices are well known. For example, U.S. 6,544,126 B2 entitled "Portable Game Machine With Download Capability" issued April 8, 2003 describes a portable handheld game machine that includes a capability to download and execute code from a source such as another game machine. However, such games are still quite large, typically limited to one or two players, and are relatively expensive and complex. Further, such game machines typically do not support collection aspects of popular card based games.

Thus, there remains a need for an interactive display device and system that permit a user to execute interactive transactions with the holders of other devices but that has a cost structure and form factor that facilitates storage of collections of such display devices.

SUMMARY OF THE INVENTION

In a first aspect of the invention, an interactive display device is provided. The interactive display device has a display, a non-volatile memory

having interaction data and image content depicting a character stored therein and a communication circuit adapted to transmit interaction data to another interactive display device and to receive interaction data from said other interactive display device. A display controller is adapted to determine modified interaction data based at least in part upon received interaction data, to determine a character image based at least in part upon the modified interaction data and the stored image content and to cause the display to present the character image. The display controller is further adapted to store modified interaction data in the non-volatile memory.

In another aspect of the invention, an interactive display system is provided. The interactive display system has a plurality of interactive display devices, each interactive display device having at least a display capable of forming images and non-volatile memory having character data stored therein. At least one source of character images and at least one source of character interaction data are provided. A communication circuit is adapted to exchange character interaction data between the plurality of interactive display devices. A display controller is adapted to determine modified interaction data for each of the interactive display devices to select at least one of the character images in the source of character images for presentation on each interactive display device based upon the modified interaction data determined for that interactive display device and to cause the character image selected for each interactive display device to be presented on the display associated with that interactive display device.

In still another aspect of the invention, a method is provided for operating an interactive display device having interaction data stored therein. In accordance with the method, another interactive display device having interaction data stored therein is detected. The interaction data from the other interactive display device is received. Modified interaction data is determined based at least in part upon interaction data received from the other interactive display device. A character image is determined based at least in part upon the modified interaction

data and the character image is presented using the display device. The modified interaction data is stored in the interactive display device.

ADVANTAGES

The interactive display devices, systems and methods of the present invention are advantageous in that they provides a low-cost, entertaining, and interactive structure enabling interactive games and social interactions between combinations of participants.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a schematic diagram of an interactive display according to an embodiment of the present invention;

Fig. 2 is a schematic diagram showing one embodiment of an interactive display having an efficient component arrangement;

Fig. 3 illustrates one example of a pair of interactive display devices used in combination;

Fig. 4 is an illustration of another embodiment of an interactive display system in accordance with the present invention;

Fig. 5a and 5b illustrate a memory map depicting, generally, one arrangement of interaction data stored in a memory of interactive display devices;

Fig. 6 is a flow diagram illustrating one embodiment of a method for executing interactive games using the interactive displays;

Fig. 7a and 7b illustrates what is presented on interactive display devices before an interaction;

Fig. 8a and 8b illustrates what is presented on interactive display devices after a first interaction; and

Fig. 9a and 9b illustrates what is presented on interactive display devices after a second interaction.

DETAILED DESCRIPTION OF THE INVENTION

In accordance with various aspects of the present invention, an interactive display and interactive display system suitable for use in interactive activities such as gaming, music creation, and other forms of social interaction are provided.

Referring to Fig. 1, one embodiment of an interactive display **8** according to the invention is shown. In this embodiment, interactive display device **8** has a display **10**, a non-volatile memory **12,** a switch **20** for turning the device on or off, and a display controller **14** for reading the non-volatile memory **12** and displaying image content on display **10** based upon data obtained from non-volatile memory **12**. The embodiment of display controller **14** shown in Fig. 1, includes a display interface **16** to display **10** and a memory interface **18** to non-volatile memory **12**. The display controller **14** includes a communication circuit **26** for exchanging data with a similar interactive display device **8**. Non-volatile memory **12** can include multiple components some of which can include volatile read-write memory (e.g. RAM) along with non-volatile memories, such as a read-only memory (e.g. ROM), or a non-volatile read-write memory (e.g. Flash Memory). Such multiple components can comprise separate structures or can be manufactured as an integrated circuit.

As will be described in greater detail below, at least a portion of display memory **12** can comprise a locking memory **13**. Locking memory **13** can be a memory that is of a type will restrict the ability of a user of interactive display device **8** to modify the data stored therein. In one embodiment, locking memory **13** comprises a conventional non-volatile programmable read-only memory or a write-once memory. In this embodiment, data can be written to the programmable read-only memory or to the write-once memory but, once written, such data cannot be erased, deleted or modified. In this way, the read-only memory provides a reliable record of data stored therein.

In another embodiment, locking memory **13** comprises a non-volatile read-write memory having a memory interface **18** that permits data to be read or written only where appropriate authorizations or codes are supplied to the write-once memory. In this embodiment, data written to locking memory **13** can be associated with interactive display system **8** in a manner that cannot be modified without appropriate authorizations.

In still another embodiment, locking memory **13** can comprise a conventional non-volatile read-write memory having data stored therein in an

encoded or encrypted fashion that is readable by display controller **14**, but that is difficult for a conventional user of interactive display device **8** to understand or reprogram properly. Various well-known encoding or encryption schemes can be used for this purpose.

Display controller **14** can be a programmable display controller such as a microprocessor, microcontroller or programmable analog device. Alternatively display controller **14** can be of a type that is not programmable and in this alternative can include a memory interface and display driver. Such a non-programmable embodiment of display controller **14** can be implemented for example with a state machine or hard-wired logic circuit. Such an alternative construction provides a low-cost and low-power display controller **14** that can perform the functions described herein.

An external interface **22** is optionally provided. In the embodiment shown in Fig. 1, external interface **22** is accessible to external circuitry **40**. When interface **22** is connected to external circuitry **40**, for example, by way of a Universal Serial Bus connector, external interface **22** can be used to transmit and receive image content and interaction data from external circuitry **40** and stores this image content in the non-volatile memory **12**. Alternative embodiments of the external interface can be provided, for example, by a networked interface to a computer network or the Internet. External interface **22** can be used to set up and program non-volatile memory **12** with image content and interaction data and for programming display controller **14**.

Communication circuit **26** is provided for enabling communication between interactive display device **8** and other interactive display devices. Communication Circuit **26** can take a variety of forms, for example it can comprise any of a transmitter, receiver, transceiver, transcoder, or any other device adapted to encode and decode data for exchange during communication with other devices and, where appropriate, a communication access port **28** that provides access to areas outside of a body **30** of interactive display device **8** to facilitate such communication. Communication circuit **26** and access port **28** are co-designed to facilitate communications. Communication circuit **26** can be

implemented in a variety of ways, including wirelessly, for example using radio frequency, optical or other known wireless communication circuits and systems to establish a wireless communication path. Examples of such wireless communication systems include but are and not limited to circuits and systems that communicate in ways that that conform to wireless communication standards such as the so-called "Wi-Fi" and so-called "Bluetooth" standards established and described at Institute of Electrical and Electronic Engineers standards 802.11a and 802.11b. Alternatively communication circuit **26** can be adapted to communicate using infrared technology using protocols established by the infrared data association (IrDA). Such protocols include, but are not limited to the serial infrared protocol (SIR) and other protocols developed by the IrDA.

In such wireless embodiments, access port **28** provides, for example, an antenna for use in radio frequency communication, or light transmitting and sensing areas adapted to optically exchange data, such as an infrared or other optical interface system known in the art.

In other embodiments, communication circuit **26** can be adapted for communication with another interactive display device using a direct electrical or optical path between access port **28** of the interactive display device **8** and another interactive display device. In such embodiments access port **28** can comprise, for example, a serial or parallel port, or a networked interface to a computer network or the Internet. One example embodiment of a communication circuit of this type is a communication circuit **26** that is adapted to enable communication using hardware and protocols that are consistent with the EIA/TIA–232–E standard entitled "Interface Between Data Terminal Equipment and Data Circuit–Termination Equipment Employing Serial Binary Data Interchange" prepared by the Electronic Industry Association and the Telecommunications Industry Association. Other example embodiments of a communication circuit of this type include circuits and systems that conform with the standards set for the universal serial bus standard, and the IEEE 1394 (so-called "Firewire") standard. Communication circuit **26** can also comprise circuits and systems that comply with other standards or that comply with proprietary standards.

In still another embodiment, communication circuit **26** can be adapted to exchange data with a portable memory device such as a removable memory card that can be held by access port **28** of interactive display device **8** and moved to an access port **28** of another interactive display device so that data can be exchanged using the removable memory card as an intermediary.

In an alternative embodiment, a direct link can be established using optional external interface **22** in addition to or in place of access port **28**.

In the embodiment shown in Fig. 1, interactive display device **8**′ comprises a power cell **29**, for example a battery, that provides power to display **10**, non-volatile memory **12**, display controller **14**, display interface **16**, memory interface **18**, switch **20** and/or external interface **22**, and communication interface **24**. In certain embodiments, power can be supplied to these components of interactive display device **8** by way of external interface **22** and/or access port **28**.

In the embodiment of Fig. 1, interactive display device **8** also comprises an optional user input system **32** to enable a user to provide input to display controller **14** that display controller **14** can use in operating display device **8**. For example, display controller **14** can determine interaction data based upon user input as will be described in greater detail below. User input system **32** can comprise, for example, a touch screen input, a touch pad input, a 4-way switch, a 5-way switch, a 6-way switch, an 8-way switch, or any other multi-way switch structure, a stylus system, a trackball system, a joystick system, a voice recognition system, a gesture recognition system or other such systems.

An optional audio system **34** can be incorporated into interactive display device **8** to convert an audio signals stored in non-volatile memory **12** into an audible form and, optionally, to record audio signals provided by a user. Audio signals can be included as part of interaction data as will be described in greater detail below. Efficient, low cost, audio playback methods are well-known and enabling devices are commercially available.

It is useful to minimize the thickness of interactive display device **8** to mimic, as closely as possible, conventional printed communications for example, cards, photographic prints, paper media and the like. To this end, the

components such as non-volatile memory **12**, display controller **14**, and switch **20** that are used in various embodiments of interactive display system **8** can be assembled on a back **36** or face **38** of display **10** as shown in the embodiment shown in Fig. 2. In particular, it may be useful to have non-volatile memory **12**, display controller **14** and communication circuit **26** affixed to the back of the display **10** and switch **20** to be affixed to a face **38** of display **10** or otherwise positioned so that it can be conveniently actuated by a user of interactive display device **8**. In this way, interactive display device **8** can take a form that is consistent with the form of a conventional collectable/trading card such as a baseball card, a football card, or the like, a collectable/trading/gaming card of the type that currently carries images of fanciful characters thereon, and/or other forms of collectable memorabilia. Interactive display device **8** can also be incorporated onto rigid or flexible and/or foldable substrates to provide a wide variety of items.

Display controller **14** and non-volatile memory **12** can be combined into a single integrated circuit and/or potted together, for example, using a protective resin to provide a small, low-cost circuit. Any protective material applied to the circuitry can be applied after the image content and interaction data is written to the non-volatile memory **12**.

In operation, a mass-produced set of image sequences and interaction data can be written into the non-volatile memory **12** before assembly of interactive display device **8** or after assembly using external circuitry **40**. Alternatively, a purchaser of interactive display device **8** can personalize the image content and/or interaction data, for example by transmitting personalization data through the external interface **22**, or communication circuit **26** . Such personalization data can include, for example, character names and character appearance, interaction information, audio, and video signals. Personalization data can also be entered using of user input system **32** of interactive display device **8**. For example, during an initial set-up phase of operation of interactive display device **8**, display controller **14** can require an operator to provide personalization data through user-input system **32**. The external circuitry **40** can also provide

additional power to interactive display device **8** during writing and may also charge power cell **29**.

According to one embodiment of the present invention, a plurality of interactive display devices **8** are provided to a group of game players. Each interactive display device **8** has a character identity. Interaction data relevant to the character identity is stored in non-volatile memory **12**. The character identity is defined in part by one or more images, an image sequence, or a stream of image information or any other form of video or graphic content relevant to the character and in part upon other interaction data that can be used by display controller **14** during various interactions, as will be described in greater detail below.

In operation, interactive display devices **8** are used in combination. As is shown in Fig. 3, this can be done by combining display device **8a** in a paired relationship with another display device **8b**. Each pair exchanges interaction data through communication circuits **26a** and **26b** . Interaction data can include, but is not limited to, character identification data, character attributes data, character status data, and image data. Display controllers **14a** and **14b** in interactive displays **8a** and **8b** will then determine modified interaction data based upon the interaction data received from the other interactive display device. Display controllers **14a** and **14b** will then use the modified interaction data and images or other graphic content stored in memory **12** to generate an entertaining image, images, or image sequence, and/or audio sequence representing the interaction of the characters on each of displays **10a** and **10b**. In this way, characters can be exchanged, characters can gain or lose attributes, points, status, power or other attributes relevant to the game or other interaction. The character interaction can be dependent on some degree of chance or on information supplied by the operator of interactive display devices **8a** and **8b** in response to questions or other opportunities for providing user input by way of user input systems **32a** and **32b** so that one operator may be lucky while another may be more knowledgeable, thereby influencing the nature of the interaction.

In any embodiment of interactive display device **8** having a locking memory **13**, locking memory **13** can be used to store a protected record of

information relevant to a character with which the interactive display device is associated. For example, locking memory **13** can be used to store data indicating an amount of character status. The character status can include thing such as remaining health or vitality which can be increased or decreased based on the nature or outcome of the interaction. By storing such information in the locking memory **13**, the character associated with the card interactive display device is provided with a virtual life. When interactions occur that negatively impact a status associated with the character, information characterizing such interactions is recorded in the locking memory **13** so that, during future interactions, the nature and/or outcome of the interaction between the character associated with the interactive display devices **8a** and **8b** will be influenced by the status of the characters as they enter the interaction.

As interactive display devices **8a** and **8b** undergo a series of interactions, the status score associated with each of interactive display devices **8a** and **8b** can be reduced. When, for example, the status score for a character associated with display device **8a** reaches a minimum threshold, display device **8a** can cease to interact with interactive display device **8b** or with other interactive display devices. In this way, a character associated interactive display device **8a** can effectively be removed from a game until the status score is restored, such as by providing a new locking memory **13**, recording restorative data in locking memory **13**, by entering an authorization or code that will cause a memory controller for a rewritable embodiment of a locking memory **13** to allow editing of the status score, by recording a revised score in locking memory **13** using a proper encodement or encryption scheme, or by otherwise storing data in locking memory **13** that adjusts the status score. In this way, the restoration of status to a character can be blocked, limited or controlled as preferred by the dictates of the game. Further, restoration of vitality can be obtained by way of purchase.

Other modified interaction data can be stored in locking memory **13**, such as a record of characters that had previously been interacted with, interaction data provided by other devices, a record of skills or capabilities obtained as a product of previous interactions and other such data.

Interactive display devices **8** having different characters can be vended by vending machines, kiosks and the like. Different interactive display devices can be selected by a purchaser, each having different attributes and that may be sold at different prices. Alternatively, groups of players may agree to establish a set of character and interaction data parameters and utilize a computer network and software to provide interaction data, such as images and other data relevant to the character such as a status score for their interactive display device **8**. In certain embodiments, users can determine characters and interaction data for use in a game by way of agreement among players and can enter these agreed upon limitations by way of user interface **32**. In other embodiments, characters and interaction data associated with those characters can be purchased for example, a user of interactive display device **8** associated with one character can purchase a particular character or a particular character status level or skill from a vendor, kiosk or on-line retailer.

Fig. 4 shows yet another embodiment of the present invention. In this embodiment, an interactive display system **50** is provided having a plurality of interactive display devices **8c** and **8d** and an interface module **60** that joins interactive display devices **8c** and **8d**. In this embodiment, each interactive display device **8c** and **8d** incorporates respectively a display **10c** and **10d**, a memory **12c** and **12d**, and access ports **28c** and **28d**. Memories **12c** and **12d** store character information as described above and can comprise locking memories **13c** and **13d**. Interface module **60** comprises a display driver **14**, and engagement ports **62** and **64** each adapted to engage an access port **28c** and **28d** respectively to establish a direct electrical connection for communication therebetween.

In the embodiment shown in Fig. 4, interface module **60** comprises a source of power **29** that is capable of supplying power to operate interface module **60** as well as displays **10a** and **10b** and memories **12c**, **12d**, **13c** and **13d** as necessary.

During operation, interactive display devices **8c** and **8d** are connected to interaction module **60** by attaching access port **28a** to engagement port **62** and by attaching access port **28b** to engagement port **64**. Such engagement

establishes a direct data path between displays **10**, memories **12c**, **12d**, **13c** and **13d**, and display driver **14**. Display driver **14** obtains interaction data from each of interactive display devices **8c** and **8d** using this data path. Upon receipt of such information, display driver **14** determines the nature of the interaction to occur between the interactive display devices **8c** and **8d**. Where appropriate, display driver **14** can then generate signals that cause either of display devices **8c** or **8d** to generate images or audio signals soliciting a user input. Such a user input can be made using user input systems **26c** and **26d** provided as a part of interaction module **60**.

Based upon the obtained interaction data and the user inputs display controller **14** can determine modified interaction data for each interactive display device **8c** and **8d**. Display controller **14** can then determine modified image content for presentation on display devices **8c** and **8d**. In the embodiment that is shown in Fig. 4, display controller **14** obtains image information from each of memories **12a**, and **12b** based upon the interaction data and generates signals that cause each interactive display devices **8c** and **8d** to present an image that is appropriate for the modified interaction data. Accordingly, in this embodiment, an interactive display device **8c** or **8d** can be provided that has a small shape and is low cost yet preserves the interactive functionality by moving certain systems and circuits that add cost to an interactive display device to interface module **60**.

In a further embodiment, each of memories **12c** and **12d** can hold only character identification data having information that identifies the character and provides interaction data for the character using the character identification data. Where this is done, interaction module **60** will be adapted to obtain character image information for each character. This can be done as shown in Fig. 4, by obtaining such information from a memory **63** with character image information and/or other information regarding the character stored therein. Memory **63** can be a component of interaction module **60** or it can be separate therefrom and joined thereto by way of a wired or wireless communication path. In one example of this type of the arrangement, the character identification data can comprise information that allows display driver **14** to obtain character image

information from a memory **63** by way of a network such as the Internet. In this for example, the character identification data can comprise a World Wide Web address. Display driver **14** uses a World Wide Web address to obtain image information. Display driver **14** then uses the obtained image information to adjust the appearance of images presented on displays **10c** or **10d** as appropriate.

In still another embodiment, each of memories **12c** and **12d** can be adapted so that they contain only character identification data that uniquely identifies the characters associated with interactive display devices **8c** and **8d** respectively. In this embodiment, display driver **14** stores character image data and character interaction data in memory **63** so that such data can be recalled using the character identification data. Accordingly, in this embodiment, the amount of data to be stored in interactive display devices **8c** and **8d** is minimal, further reducing the cost of an interactive display device of this type.

It will also be appreciated that, in these embodiments, a display driver **14** and source of power is not provided for each interactive display device **8**. Such an approach is possible where a non-volatile display **10** is used to present image information. It is characteristic of a non-volatile display **10**, that it allows images to be electronically written and electronically rewritten to non-volatile display. However, once written, the written content maintains the appearance that is written thereon without requiring additional power input.

One popular embodiment of such a non-volatile display **10** is a bi-stable cholesteric display device. Such a non-volatile display **10** provides reflective picture elements that have at least two states and that can be transitioned from one state to at least one other state to form images. Non-volatile display **10** can comprise for example, a reflective passive-matrix display. Such reflective passive matrix displays can be employed because they do not require energy for light emission and are well-suited to low-cost control and manufacturing methods. One such display using bi-stable cholesteric materials is described in U.S. Patent No. 5,437,811 entitled "Liquid Crystalline Light Modulating Device and Material" issued August 1, 1995. Such displays can be made on flexible substrates and with low-cost roll-to-roll or continuous manufacturing methods thereby reducing cost

and providing useful attributes in an interactive display application. Where such a nonvolatile display is used, interface module **60** can provide the necessary circuits and systems for writing images to the display **10**. In this way, each interactive display device **8** can be made inexpensively and in a form factor that can be conveniently collected and stored in a manner that is consistent with conventional practices.

In other embodiments of the invention, display **10** can be implemented with a variety of flat-panel display technologies, including full-color organic light emitting diode (OLED) displays or liquid crystal displays (LCDs) and appropriate drivers and power sources can be supplied in interactive display devices that operate such display types so that they can present images as required by a user.

Turning now to Figs. 5 - 7, an illustrative example of an interaction sequence for a pair of display devices is provided. For the purposes of this example, an interaction between display devices **8a** and **8b** as shown in Fig. 3 will be described. Figs. 5a and 5b show an example of a memory map depicting, generally, one arrangement of interaction data **70a** and **70b** stored in non-volatile memories **12a** and **12b** of interactive display devices **8a** and **8b**. For the purposes of this example it will be assumed that, at the time that interactive display devices **8a** and **8b** are first provided, each non-volatile memory **12a** and **12b** has a set of character images **72a**, **74a**, **76a**, **78a**, and **72b**, **74b**, **76a** and **78b** respectively stored therein. Each image in each set of images depicts an image of a character having a different appearance that corresponds to one of a set of status scores **80a** and **80b**. Initially each character has a status score of 3 and therefore display controllers **14a** and **14b** cause the images **72a** and **72b** to be presented, respectively, on displays **10a** and **10b**.

Fig. 6 is a flow diagram illustrating one embodiment of a method for a executing an interactive game using two interactive display devices such as interactive display devices **8a** and **8b**.

As is shown in Fig. 6, in a first step of the method each display device **8a** and **8b** detects the other interactive display device, devices **8b** and **8a**

respectively (step **100**). Such detection is typically performed, when a communication path is established between display devices **8a** and **8b**. As described above, such a communication path can be established using a wireless connection or wired connection or by using an intermediary such as a memory card, or by other conventional communication systems.

When the communication path between interactive display devices **8a** and **8b** is detected, display controllers **14a** and **14b** will exchange interaction data (step **110**). As noted above, the interaction data can comprise any information that identifies a character, a character's status and other information about the character that is stored in a non-volatile memory **12** and/or locking memory **13** of an interactive display device with which the character is associated. The interaction data can comprise other information such as, in this example, information that defines a desired interaction. For example a user of interactive display device **8b** can use user input system **32** to indicate that the user wants the character associated with interactive display device to interact with the character associated with interactive display device **8a** in a particular manner. Such input can be used by display controller **14b** and, optionally, can be conveyed to interactive display device **8a** as a part of the interaction data. Similarly, display controller **14b** will receive interaction data from interactive display device **8a**.

Based upon the interaction data exchanged, display controllers **14a** and **14b** will determine modified interaction data (step **104**). In this embodiment, this step is performed by determining a modified status score based upon the received interaction data. There are many ways in which this can be done. For example, the interaction data can define a type of interaction such as an attack mode for each interactive device and a defense mode for each interactive device. The attack mode selected for the character associated with interactive display device **8a** can be for example a "kick high mode" while the defense mode is "block low mode" while the attack mode selected for the character associated with interactive display device **8b** can be an "attack middle mode" while the defense mode is a "block high" mode. In such a situation, the status for the character associated with interactive display device **8a** can be reduced by 2 levels because

the character did not block the attack nor did the character's attack succeed, while the status for the character associated with interactive display device **8** be can remain at the same level because the character associated with interactive display device **8b** blocked the selected attack. It will be appreciated that a wide variety of variations are possible.

In this example, the revised status for each character associated with display devices **8a** and **8b** comprises the modified interaction data. This modified interaction data is then used to determine an image to be presented using displays **10a** and **10b** (step **106**). In this embodiment, display controller **14a** uses the revised status level to select image **76a** from non-volatile memory **12a** and causes this image to be presented on display **10a** as is shown in Fig. 7a. Similarly, display controller **14b** uses the revised status level determined for the character associated with display device **8b** to obtain image **74b** from non-volatile memory **12b** and causes this image to be presented on display **10b** as is shown in Fig. 7b.

Display controllers **14a** and **14b** then determine whether to engage in another round of interaction (step **108**). There are a variety of ways in which this determination can be made. For example, where the connection between interactive display device **8a** and interactive display device **8b** remains for a period of time after the first round of interaction is complete, then it can be determined that there is a desire for another round of interaction. Alternatively, interactive display device controllers **14a** and **14b** can present an inquiry using displays **10a** and **10b**, or audio system **34a** and **34b** to solicit a user input as to whether an additional round of interaction is to occur. In still another embodiment, interactive display device controllers **14a** and **14b** can be adapted to continue interactions until one of the characters associated therewith reaches a 0 status level or some other minimum threshold.

For the purposes of this example, the latter embodiment is used. As the status for both of the characters is above the 0 level, another round of interaction is to occur, and the process returns to the steps of exchanging interaction data (step **102**) and determining modified interaction data using the interaction data (step **104**). If, in this example, as result of the second round of

interaction, the status of each character in the interaction is reduced by one level, then the status level of the character associated with interactive display device **8a** is reduced to the 0 level and the status level the character associated with interactive display **8a** is reduced to the two level. Accordingly, as is shown in Fig. 9a where this occurs, display driver **14a** obtains image **78a** from non-volatile memory **12a** and causes this image to be presented on display **10a** (step **106**). Similarly, as is shown in Fig. 9b display driver **14b** obtains image **74b** from non-volatile memory **12** and causes this image to be presented on display **10b** (step **106**). Such images continue to be presented until further modified status is determined for example as a result of reprogramming or subsequent interaction.

At this point, because the character associated with interactive display device **8a** has a 0 status level, it can be determined that the interaction between interactive display device **8a** and interactive display device **8b** is complete (step **108**). The process then moves to the step of storing modified interaction data (step **110**). In this step, the status level associated with each character at the completion of the interaction cycle is recorded in non-volatile memories **12a** and **12b** respectively. In certain embodiments, the status level is recorded in a locking memory **13**. Depending upon rules for the interactions involved, other information can be stored in non-volatile memory **12a** and non-volatile memory **12b** as a result of the interactions. For example, in selected games that are currently popular, each character is associated with a specific set of capabilities. In one embodiment of the invention, a set of capabilities can be associated with a character and when one character effectively reduces the status level of another character to 0, then the surviving character can absorb the capabilities of the reduced character. Such additional capabilities can be recorded in a non-volatile memory **12** and/or a locking memory **13**. In this way, characters are created that have an evolving set of characteristics and capabilities and that become more valuable as they successfully interact other interactive display devices.

After the modified interaction data has been stored (step **110**), at least one of the interactive display devices (e.g. interactive display device **8b**) can search for additional interactive display devices to engage in further interactions (step **112**)

The invention has been described in detail with particular reference to certain preferred embodiments thereof, but it will be understood that variations and modifications can be effected within the spirit and scope of the invention.

PARTS LIST

8	interactive display device
10	display
12a, b, c, d	non-volatile memory
13a, b	locking memory
14a, b, c, d	display controller
16a, b	display interface
18a, b	memory interface
20a, b	switch
22a, b	external interface
24a, b	communication circuit
26a, b	communication transducer
28a, b	access port
29a, b	power cell
30	body
32a, b	user input system
34a, b	audio system
36	front of display
38	back of display
40	external circuitry
60	interface module
62	port
64	port
70a, b	interaction data
72a, b – 78a, b	character images
80a, b	status score
100	detect display device step
102	exchange interaction data step
104	determine modified interaction data step
106	display image step

108	interaction complete determine step
110	store modified interaction data step
112	additional interaction step